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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,528	10/31/2003	Ryo Nakagaki	16869N-099100US	4228

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EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 04/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/699,528

Applicant(s)

NAKAGAKI ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 16-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 16-20 and 22-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 16, line 8, "a critical predetermined portion" is vague and indefinite. It is unclear how the predetermined portion is defined to be critical.

Claim 22 recites the limitation "between the measured features" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim because no measuring step is recited in the process.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 16-26 are rejected under 35 U.S.C. 103(a) as being

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unpatentable over Muckenhirn (US 2003/0168594) as evidenced by Bendik et al. (US 6,673,638), Demmin (US 6,635,185), Singh et al. (US 6,778,268) and Yoshitake et al. (US 2003/0121022).

In a method and system for measuring microscopic surface features, Muckenhirn ([0002], [0003], [0054][0065][0073], Figs. 3 and 4; pages 5, 6 and 8) teaches that a test pattern and an actual circuit pattern on a semiconductor substrate may be formed by a predetermined semiconductor manufacturing process (e.g., Fig. 3, step 302; Fig. 4, steps 408 and 414) while varying a process parameter (e.g., Fig. 4, step 418; page 6, [0054]). The features of the three-dimensional shape of the patterns (e.g., lines and space pattern may be measured by use of an optical scatterometry apparatus (e.g., [0003], lines 8-12). Muckenhirn teaches measuring and generating library graphs, comparing with specification (e.g., page 8, [0073] and claim 1 of Muckenhirn). Hence, it would have been obvious to one with ordinary skill in the art to perform calculation (such as manipulating data and performing calculation using various design rules, statistical methods e.g., regression, extrapolation, best-fit, fitting function) and prepare a correspondence relationship between test pattern and feature of the actual circuit pattern and the correspondence relationship between the process parameters and the measured features, and perform the evaluation (claim 16), also the correspondence relationship between the measured feature of the test pattern and the varying process parameters, and the correspondence relationship between the varied process parameters and the measured features of the critical portion of the actual circuit pattern (e.g., claims 21 and 22) See also

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some calculations and data analysis examples in Singh et al. (US 6,778,268) and Yoshitake et al. (US 2003/0121022) as evidence. Once completing the above measuring and calculation, an amount of the critical portion may be estimated based on the correspondence relationship, also see Fig. 4 and page 6, [0054]. The semiconductor manufacturing process for the actual circuit pattern may be evaluated based on the estimated amount. Muckenhirn teaches that the features are typically formed by photolithography process, making the process of exposure and development process (claim 18) obvious, also see Bendik et al. (US 6,673,638; abstract, col. 2) as evidence. Muckenhirn teaches monitoring the semiconductor manufacturing process and a complete characterization of three-dimensional profile of the feature. Muckenhirn also teaches AFM or SEM may be used for the measurement in combination with scatterometer (claim 17). Muckenhirn teaches monitoring the process parameters for forming holes contact holes, trench structures using etching process, making the changes of etching process parameters (e.g., claims 16, 19, 21, 22) obvious, also see Demmin (US 6,635,185; col. 7, lines 5-25) as evidence.

As to dependent claims 20 and 23-26, Figs 3 and 4 and page 6, [0054] of Muckenhirn and the above reasoning making aforementioned dependent claims obvious.

Response to Arguments

4. Applicant's arguments filed March 22, 2006 have been fully considered but they are not persuasive.

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Applicant has argued that the Muckenhirn does not teach the particular technique of forming test structures and particular techniques described and claimed by applicant. In response, applicant has not pointed out what the particular technique of forming test structures and particular techniques described and claimed **specifically**, and how they are novel and unobvious to one skilled in the art.

A reference is good not only for what it teaches but also for what one of ordinary skill might reasonably infer from the teachings. In re Opprecht 12 USPQ 2d 1235, 1236 (CAFC 1989); In re Bode USPQ 12; In re Lamberti 192 USPQ 278; In re Bozek 163 USPQ 545, 549 (CCPA 1969).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bendik et al. (US 6,673,638; abstract, col. 2) teach adjusting the exposure and development process in response to the measurements using SEM, AFM, and scatterometer. Singh et al. (US 6,778,268) and Yoshitake et al. (US 2003/0121022) perform calculation and data analysis using the measurements conducted by scatterometry. Demmin (US 6,635,185; col. 7, lines 5-25) discloses that one skilled in the art of plasma etching and cleaning may vary type of plasma etching (RIE, HDP, plasma etching..), composition, flow rate, temperature, pressure, power, time, bias, .. accordingly to etch a desired material satisfactorily.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.**

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See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on

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access to the Private PAIR system, contact the Electronic Business Center
(EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'K. Chen', with a long horizontal flourish extending to the right.

Kin-Chan Chen
Primary Examiner
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April 24, 2006